compound with shorter duration of action, and pancuronium, with fewer side effects than tubocurarine, were introduced. Gallamine, and to a lesser extent, pancuronium, produce tachycardia. Pancuronium, because of its lack of hypotensive action currently is gaining wide acceptance. Dimethyl tubocurarine, a long known but clinically neglected agent, seems to be reentering clinical practice because of its minimal circulatory effects.

The present consensus favors introduction of a curare type nondepolarizing muscle relaxant with shorter onset and duration of action than presently available. Some compounds of this type were developed in recent years, but most of them fell short of clinical requirements. As a consequence, the reversal of the existing, longer-acting agents remains a problem of patient management.

A further variant of drug application in this field is the substitution of glycopyrrolate in place of atropine in the "reversing process." Less tachycardia and dysrhythmias are claimed with this agent during the reversing process.

Development of new rapidly acting, evanescent neuromuscular blocking agents whose intensity of action can be regulated by continuous adjustment of the rate of administration, and improvements on the techniques of pharmacological reversal of the existing agents are two realistic avenues through which optimal therapeutic conditions in this clinical field may be achieved.

LASZLO GYERMEK, MD

**REFERENCES**

Katz RL: Pyridostigmine (Mestinon®) as an antagonist of d-tubocurarine. Anesthesiology 28:528-534, May-Jun 1967

Ramamurthy S, Shaker MH, Winnie AP: Glycopyrrolate as a substitute for atropine in neostigmine reversal of muscle relaxant drugs. Can Anaesth Soc J 19:399-411, Jul 1972

Savarese JJ, Kitz RJ: Does clinical anesthesia need new neuromuscular blocking agents? Anesthesiology 42:236-239, Mar 1975

Gyermek L: Clinical studies on the reversal of the neuro-muscular blockade produced by pancuronium bromide—I. The effect of glycopyrrolate and pyridostigmine. Curr Ther Res 18:377-382, Sep 1975

## Chronic Pain Management: Developing Trends

CHRONIC benign and functional pain syndromes are yielding to pharmacologic and psychologic study to show a surprising variety of diagnostically distinct and therapeutically manageable entities.

Spinal anesthesia was applied systematically in these syndromes in the 1930's. However, this was not widely exploited until this decade as the differential spinal block. This technique utilizes intrathecal injections of solutions at ten-minute intervals beginning with a 0.9 percent solution of sodium chloride. This is followed by procaine solutions in increasing concentrations of 0.25 percent, 0.5 percent, 1 percent and 2 percent. The saline solution is a placebo and the procaine solutions sequentially block the sympathetic, somatic and motor divisions of the central nervous system. Pain which is relieved by placebo or is not relieved by paretic or paralytic concentrations is interpreted as central pain and can be further evaluated with psychologic testing. Central pain syndrome implies that the pain complaint is resistant to peripheral somatic interventions and is independent of peripheral pathology, such as laminectomy scars. Relief by placebo implies cortical control over the pain complaint.

Using this technique, Winnie reported on a series of patients with bizarre back and leg pains which were relieved by sympatholytic concentrations of procaine. This suggests either vascular problems or occult sympathalgias (reflex sympathetic dystrophies) in 75 percent of patients with pain of unknown cause. Relief by somatic block suggests an organic basis for pain. However, painful muscle spasm secondary to anxiety is relieved by somatic block although it is a reflection of a psychologic state. Differential block has resulted in a change in diagnosis in 59 percent of patients seen at the Stanford Medical Center's Pain Clinic. When the Minnesota Multiphasic Personality Inventory (MMPI) is used to evaluate central pain states further, characteristically the pain complaint represents depression, anxiety or hysteria. In patients for whom findings on psychological tests are normal, pain may be related to persistent environmental reinforcement (operant conditioning), for example, in seeking affection from an inattentive spouse. Another group in this category is existential pain in which the pain gives meaning to life often in a religious or social context. Central pain may also result from anatomic neural damage, such as tabes dorsalis or thalamic syndrome.

Phenothiazines and the tricyclic antidepressants are remarkably effective in the management of pain as a manifestation of anxiety-depression. Supportive psychotherapy is useful for hysterics, and behavior modification is helpful for patients with the "habit" of a pain complaint. In patients for whom the cause of the pain syndrome is refractory to specific treatment or is still uncertain, development of coping skills is of benefit. This

may be done through psychotherapy, hypnosis or biofeedback. Transcutaneous nerve stimulation is useful for patients with pain mediated by the somatic sensory system and selected central pain syndromes. Therapeutic nerve block retains a place in the management of active herpes zoster, acute low back pain and sympathalgias.

The most profound step in the management of chronic pain in the past decade has been to eliminate emphasis on surgical procedures and medications and develop coping resources in a patient often by exploring the meanings of pain.

BERNARD S. MILLMAN, MD
STEPHEN FISK, MD

**REFERENCES**

Winnie AP, Ramamurthy S, Durrani Z: Diagnostic and therapeutic nerve blocks: Recent advances in technics. Adv Neurol 4:455, 1974

Wiltse LL, Rocchio PD: Preoperative psychological tests as predictors of success of chemonucleolysis in the treatment of low back syndrome. J Bone Joint Surg 57:478-483, Jun 1975

Fordyce WE: Office management of chronic pain—Learning factors. Minn Med 57:185-188, Mar 1974

## ADVISORY PANEL TO THE SECTION ON ANESTHESIOLOGY